N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

Tzeng, Huey-Ming

http://hdl.handle.net/2027.42/64943
Research Design

Contributors
Sonia A. Duffy, PhD, RN
Lisa Kane Low, PhD, CNM, FACNM
Huey-Ming Tzeng, PhD, RN
Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality

A  →  B
Pressure  →  Ulcer

Multicausality

Year smoking  →  Heart disease
High fat diet  →  Heart disease
Limited exercise  →  Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
• Controlling extraneous variables

  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?
- No
- Yes

Is the primary purpose examination of relationships?
- No
- Yes

Is the treatment tightly controlled by the researcher?
- No
- Yes

Descriptive Design
- Will the sample be studied as a single group?
  - No
  - Yes

Quasi-Experimental Study
- Will a randomly assigned control group be used?
  - No
  - Yes
  - Is the original sample randomly selected?
    - No
    - Yes

Correlational Design

Experimental Study
Selecting a Descriptive Design

Examine sequences across time?

No

One Group?

No

Comparative Descriptive Design

Yes

Descriptive Design

Data collected across time?

No

Cross-sectional design

Yes

Studying events partitioned across time?

No

Trend Analysis

Yes

Repeated measures of each subject

No

Yes

Longitudinal Study

Yes

Case Study

Single unit of study

Research Design

Cross-sectional design with treatment partitioning

Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

Phenomenon of Interest

Variable 1 → Description of Variable 1
Variable 2 → Description of Variable 2
Variable 3 → Description of Variable 3
Variable 4 → Description of Variable 4

Interpretation of Meaning

Development of Hypotheses
A Comparative Descriptive Design

Group I
{variables measured}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Development of Hypotheses

Group II
{variables measured}

Describe

Describe
Selecting the Type of Correlational Design

- **Describe relationships between/among variables?**
  - Descriptive correlational design

- **Predict relationships between/among variables?**
  - Predictive correlational design

- **Test theoretically proposed Relationships?**
  - Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Development of Hypotheses

Research Variable 2

Description of variable
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
- No
  - Pretest?
    - No
      - One-group post-test only design
    - Yes
      - Repeated Measures?
        - Yes
        - Repeated Measures?
          - Yes
          - Strategy for Comparison
            - No
              - Suggest Reevaluating design
            - Yes
              - Compare treatment & control conditions?
        - No
          - Strategy for Comparison
            - No
              - One group pretest/post-test design
            - Yes
              - Compare treatment & control conditions?
Selecting The Type of Experimental Design

- Pretest
  - Yes
    - Repeated Measurements?
      - Yes
        - Repeated measures design
      - No
        - Examine effects of confounding variables?
          - Yes
            - Blocking?
              - Yes
                - Randomized Block Design
              - No
                - Comparison of multiple levels of treatment
          - No
            - Multiple sites?
              - Yes
                - Pretest/post-test control group design
              - No
                - Randomized clinical trials
      - No
        - Post-test only control group design

- No
  - Pretest/post-test control group design
  - Randomized clinical trials
  - Examination of complex relationships among variables in relation to treatment

Research Design
<table>
<thead>
<tr>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST ➔ TREATMENT ➔ POST-TEST</td>
<td>Randomly selected control group</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation**
- Restricted generalizability as control increases
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>Randomly selected control group</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
<th>POST-TEST</th>
</tr>
</thead>
</table>
Mortality  
Limited generalizability as control increases |
<table>
<thead>
<tr>
<th>Pain Control Management</th>
<th>Traditional care</th>
<th>PRN Medication</th>
<th>New approach: “Around the clock” medication</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Unit A</td>
<td>Unit B</td>
<td>Unit C</td>
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<tr>
<td></td>
<td>Unit D</td>
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<td>Unit E</td>
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<td>Unit G</td>
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<td>Unit H</td>
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</table>

<table>
<thead>
<tr>
<th>Primary Nursing Care</th>
<th>Unit A</th>
<th>Unit B</th>
<th>Unit C</th>
<th>Unit D</th>
<th>Unit E</th>
<th>Unit F</th>
<th>Unit G</th>
<th>Unit H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Care</td>
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<tr>
<td>No Primary Care</td>
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</tbody>
</table>
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design